

# Summitville Update

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT  
U.S. ENVIRONMENTAL PROTECTION AGENCY

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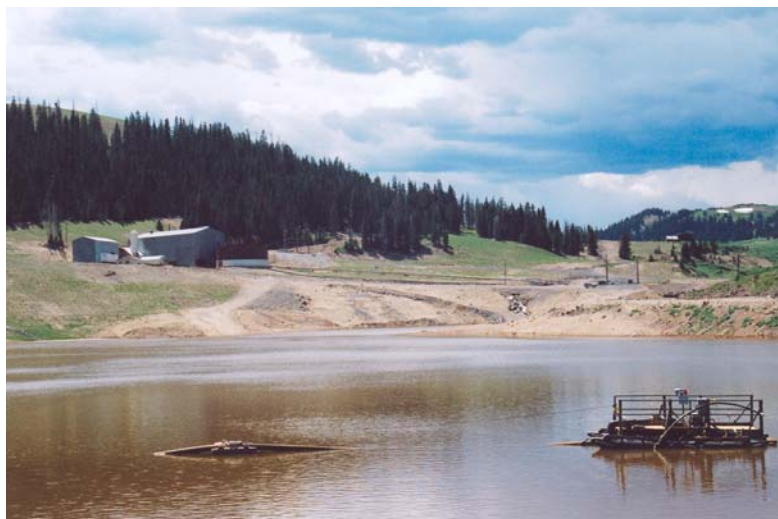
## SUMMITVILLE WATER TREATMENT HAS RECORD YEAR ABOVE AVERAGE SNOWPACK TESTS REMEDIAL PERFORMANCE

*By Austin Buckingham*

What's good news for area farmers and ranchers makes the Summitville crew a little nervous. Water!

This year Summitville received approximately 165% of average snow pack—the highest snow pack since 1997!

With a little planning, initiative, and some duct tape, Summitville achieved a record year of water treatment, approaching 298 million gallons (see Figure 1).



The Summitville Dam Impoundment and water treatment plant are the heart of Summitville's water treatment system.

Site managers opened the site earlier than usual because of their expectations of an above-average spring runoff. The operation and maintenance contractor, Golder RTG, opened Summitville three weeks early on April 1, rather than April

20, which had been the practice for the last few years.

In another move to increase storage capacity during the snowmelt, the dam

impoundment was drawn down to a very low level before spring runoff began.

While record water treatment

*(Continued on page 6)*

## Latest at Summitville

- **Summitville has Record Year for Water Treatment**
- **5-Year Review and Community Involvement Plans Completed - Available**
- **National Remedy Review Board (NRRB) Looks at New Technologies, Cost Savings at Summitville**

## FIVE-YEAR REVIEW OF REMEDIAL DESIGN COMPLETED

*By Austin Buckingham*

The purpose of a Superfund five-year review is to evaluate the implementation and performance of an environmental cleanup, in order to determine if it is protective of human health and the environment.

The Summitville Five-Year Review evaluates data collected since a previous review, which

was completed by the EPA in August 2000.

Overall, the results of the Five-Year Review indicate that all immediate threats at the site have been addressed and the remedy is expected to continue to be protective of human health.

Although significant improvements to the environment have been realized,

the review found that the remedy will not be fully protective of the environment until the final remedy components are completed as proposed.

Due to limits of treatment and storage capacity, Summitville continues to discharge contaminated water at concentrations in excess of the remedial action levels. The

*(Continued on page 4)*



Colorado Department  
of Public Health  
and Environment



## SUMMITVILLE WATER TREATMENT 101

*By Mary Scott*

During July 2005, the Summitville crew prevented over 11 tons of metals from entering the Alamosa River system. How did they do this? With continuous, efficient operation of Summitville's water treatment plant (WTP).

Contaminant flows from several sources at the site are directed to the Summitville Dam Impoundment (SDI). A pump suspended from a raft is floated in the SDI to collect water and pump it to the WTP. A flow rate of 1,000 gallons per minute is maintained.

The water flowing into the WTP has a pH of approximately 3 standard units. This acidity is similar to what is found in vinegar, citrus fruits, or cola. The water also contains large quantities of dissolved metals. Adding metals to an acidic environment is like adding salt to water. The low pH allows the metals to exist as species, and they are invisible to the naked eye.

The contaminated water is pumped from the SDI into one of two identical mix tanks at the plant, where lime is added to elevate the pH to 9. When the pH is raised, the metals precipitate, or fall out of solution. The metal precipitates are very small, and cause the water to look muddy. To allow time for the lime to fully react, the solution overflows into a pair of reaction tanks, where it continues to mix.

The overflow from the two reaction tanks is combined into a single pipe for conveyance to the clarifier. A polymer that has been activated into a low concentration liquid is added in-line downstream of the mix tanks to promote flocculation, or bonding of the precipitate. Typical polymer addition rates are 3 to 4 parts per million. The polymer serves as a bonding agent and gathers together many small precipitates to form a larger "floc particle." The floc particle has a mass associated with it, and given the opportunity, will settle out of solution.

The clarifier, located outside of the facility, provides this opportunity. The 75-foot diameter clarifier allows the flocculated solids to settle out at the bottom of the tank, while the clarified water overflows into a launder and is discharged to Wightman Fork. Clarifier effluent failing to meet discharge criteria can be recycled back to the SDI. A slow speed rake prevents the solids in the base of the clarifier from hardening.



A portion of the solids settled in the clarifier is recycled back to the mix tanks. These previously formed solids provide a precipitation site to enhance metals removal and aid in the formation of a compact, dense floc. The remainder of the solids is pumped to the sludge holding tank. The concentration of solids in this liquid sludge typically ranges from 4 to 8 percent.

When a sufficient quantity of sludge has accumulated in the holding tank, it is pressed. The WTP utilizes a 100-cubic foot plate-and-frame filter press to reduce the moisture content and volume of sludge requiring disposal. The sludge is pumped to the press at a pressure of 100 pounds per square inch. The resultant filter cake has a solids content of 25 to 30 percent. Approximately seven press cycles are required per day. The dewatered filter cake is disposed of at an on-site repository.

An average of approximately 720 pounds of sludge was removed each day in July 2005. This includes 312 pounds of iron, 268 pounds of aluminum, 59 pounds of copper, 51 pounds of manganese, and 29 pounds of zinc.

**Joe Fox, Summitville on-site coordinator, illustrates the use of polymers in water treatment during a recent tour for elected officials. State Representative Rafael Gallegos listens.**

**During July 2005, the Summitville crew prevented over 11 tons of metals from entering the Alamosa river system.**





## REYNOLDS AND CHANDLER ADITS INSPECTED

*By Austin Buckingham*

During historic hard-rock mining at Summitville adits, or tunnels, were dug deep into South Mountain to access the ore. The two largest adits at Summitville are the Chandler and the Reynolds.

The Reynolds and Chandler adits are annually inspected. This inspection is part of the on-going site monitoring and maintenance. Detailed inspections were planned this year to coincide with the Five-Year Review (*see page 1*). During this year's inspection, every timber within the adits was inspected and documented by a mine adit specialist.

Plugs, or bulkheads, were installed in the adits in the 1990s to control acid mine drainage. Consequently, both plugs are beginning their second decade of service. Timbers were replaced in both adits in 1995 and again in 2000. The adit supports

consist entirely of wooden timber rectangular sets. At least four generations of timbers are present in the adits. Bulkheads are made of reinforced concrete. Valves penetrate the bulkheads so that hydrostatic pressure can be measured and water from the mine pool can be released, if necessary.

The inspection consultant, seeking to maintain safe conditions and access to the adits and bulkheads, made both short-term and long-term recommendations.

Short-term recommendations include reinforcing or replacing rotten timbers, and examining the footings under the timber posts and reinforcing them where necessary. The inspector also recommended repairing the boardwalk, removing accumulated mud in the adits and checking the bulkhead and pressure gauges annually.



Dennis Witty, Jim Hanley, Joe Fox and Christoph Goss before entering the Reynolds adit for its annual inspection.

There were two long-term recommendations. One was the development of a mine pool management plan for when storage and treatment capacity at the site allows for the management of the extra water from the mine workings.

The other long-term recommendation is to inject a special material called

"cellular concrete" which provides better support to the adit sides and roof. This would also create a new bulkhead closer to the portal of the adit, in preference to maintaining the entire 1,265 feet of the Reynolds Adit to the bulkhead.

## SUMMITVILLE DAM IMPOUNDMENT IN GOOD SHAPE

*By Austin Buckingham*

One of the key elements of the final remedy is the Summitville Dam Impoundment (SDI), where acidic water contaminated with acid mine drainage is stored until it can be pumped to the water treatment plant for treatment.

This year a thorough inspection found that the overall dam condition was satisfactory, which is the highest possible ranking.

The SDI is regularly inspected, most recently in 2000, 2001 and 2002.

A representative of the Colorado Division of Water Resources (DWR) conducted the most recent inspection in July 2005.

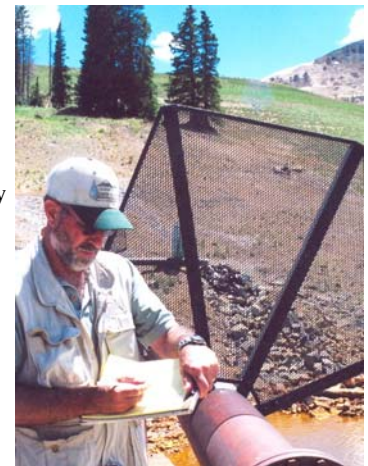
A DWR report noted various items requiring action by the state health department to improve the safety of the dam. These items were presented in two categories: maintenance, minor repair and monitoring and engineering.

Under the first category, the inspection noted that the outlet gates should be lubricated and operated through a full cycle on an annual basis to check for

corrosion. An area of seepage above the outlet was also identified as in need of monitoring. Additionally, pipeline and support piers, along with log debris, should be removed from the spillway approach channel.

The engineering recommendation was the placement of additional erosion protection in the lower spillway channel.

The DWR concluded that the SDI could be safely operated to its full storage level without restriction.



A Division of Water Resources inspector takes notes during the inspection of the Summitville Dam Impoundment.

## 5-YEAR REVIEW CONTINUED

(Continued from page 1)

impact of these untreated releases is that surface water standards in the Alamosa River are exceeded on a regular basis. These exceedances have been due, in part, to groundwater loads entering Wightman Fork and the release of contaminated water from the Summitville Dam Impoundment and turnout structures during years of normal or above normal precipitation.

The final site-wide remedy (Operable Unit 5 or OU5) is largely incomplete. The purpose of the final site-wide remedy is to address remaining threats to the environment that have not yet been addressed.

The site does not pose a risk to human health, and while protection of the environment has significantly improved, it has not fully been achieved. The primary reasons for this lack of protectiveness to the environment are:

- Contaminant load reduction is less than anticipated for some remedial elements, specifically site-wide reclamation (OU4). Therefore it is necessary to treat large volumes of contaminated water that exceed system capacity.
- Water treatment and storage capacity are not able to manage greater than average conditions encountered during spring run-off.
- Highly unpredictable precipitation and melt-off conditions.

Several final site-wide remedy elements have been completed, including the upgrading of select site ditches; the construction of groundwater interceptor drains, pipelines and impact basin; and the construction of a Highwall ditch and sedimentation basin.

Meanwhile, various key elements of OU5 have not been completed. These include the construction of a new water treatment plant, the possible enlargement or replacement of an on-site contaminated water impoundment, the construction of a sludge disposal repository, the upgrade of Wightman Fork Diversion, the rehabilitation of Reynolds Adit, and management of mine pool water (water in mine workings in South Mountain).

At the site, maintenance, groundwater, surface water and geotechnical monitoring are ongoing. In the Alamosa River and Terrace Reservoir surface water, sediment and aquatic life monitoring are also ongoing.

The most important of the remaining remedial elements that must be implemented relate to adequate water treatment capacity and storage capacity. Without these essential components of the final remedy, the water management system (storage and treatment) is overwhelmed, with 50 to 80 million gallons of excess contaminated water produced during spring runoff. Also, a new treatment facility is needed to retire an aging plant subject to increasing mechanical and electrical failure frequency and significance.

Several issues have come to light since the publication of the ROD and the construction of select components at the site. These issues identified in the Five-Year Review are:

- Interim Water Treatment Plant OSHA repairs and treatment capacity
- Non-point source contaminant loading to Wightman Fork
- OU4 Site Wide Reclamation assumptions
- Mine pool management
- Heap Leach Pad reservoir
- Potable water source for the current and future Water Treatment Plant

The Five-Year Review identified the following recommendations and follow-up actions:

- Implement the remaining OU5 remedial components as soon as funding becomes available, the most important of which is a new, large capacity WTP.
- Investigate remedy options for controlling non-point source discharges.
- Revise the site hydraulic model and water balance.
- Rehabilitate Reynolds Adit or long-term stabilization.
- Explore other remedies that might result in permanent, passive or semi-passive control of contaminant sources.
- Monitor all on-site and off-site remedial elements and affected media.
- Conduct on-site ground water and seep sampling.
- Conduct off-site sediment and aquatic life sampling in the Alamosa River.
- Release fish in Terrace Reservoir.



An early photo of South Mountain, long before open-pit mining operations.

The Five-Year Review is available at the Summitville repositories located in La Jara and Del Norte, and on the CDPHE Summitville webpage  
[www.cdphe.state.co.us/hm/summitville.asp](http://www.cdphe.state.co.us/hm/summitville.asp)

Summitville in 2000; site-wide reclamation work consisted of grading, ditch construction, soil





## FUTURES ACTIVITIES AT SUMMITVILLE

*By Austin Buckingham*

Since the construction of new structures at Summitville will become less frequent in the future, the Colorado Department of Public Health and Environment is focusing on activities that will result in safer operations, and in the optimal management of water storage and water treatment capacities.

Below is a look at some of the activities that are planned at Summitville:

### **Wightman Fork Diversion around the Summitville Dam Impoundment (SDI)**

As Wightman Fork flows through the Summitville site, it is diverted into a channel around the SDI.

Improvements to the Wightman Fork Diversion will include raising the berm between the Diversion and the SDI.

A downgradient culvert will also be upgraded from a 100-year flood event capacity to a 500-year flood event capacity. The upgradient culvert is already designed to survive the 500-year flood event.

### **Summitville Dam Impoundment**

Two improvements are scheduled for the SDI:

The SDI spillway channel will be upgraded and reinforced to conform to the State Engineers Office requirements.

In addition, a small access road will be built within the SDI to provide safe placement of the pump that is used to withdraw water from the SDI and pump it to the water treatment plant.

### **“L-Ditch”**

The L-Ditch conveys clean surface water runoff from the mine pit area and the remnant open pit Highwall offsite via Cropsy Creek Diversion channel. It is equipped with a turnout structure so that any runoff found to be contaminated may be routed to the SDI for treatment.

Though substantial reclamation has been conducted in the sub-basin which discharges to the L-Ditch, the water quality there is not clean enough to discharge directly offsite without treatment. Because the L-Ditch generates a significant volume of water that is currently diverted to the SDI, reducing the volume of water is an important component to reducing the water treatment burden.



**The state health department and EPA will work to improve worker safety conditions at the old water treatment plant.**

Investigations will be performed to locate the source of contamination and construct collection structures to allow only dirty water into the SDI.

### **Hydraulic Analysis**

Following the construction of contaminant source collectors or ditches, a re-analysis of the site hydraulic model will be prepared.

The purpose is to predict how all of the different water sources are managed and routed around the site and to assure that culverts, ditches and impoundments are of adequate size to route and hold the water.

### **Water Treatment Plant**

The water treatment plant and the rest of the site must comply with worker safety requirements.

The Colorado Department of Public Health and Environment is currently working with the operation and maintenance contractor to determine if there are safety concerns, what the nature of the safety concerns are and how to best remedy them. Initial assessments are currently underway. This will be a multi-year effort.

**The Wightman Fork Diversion directs the waters of Wightman Fork around the SDI.**



## RECORD WATER TREATMENT CONTINUED

(Continued from page 1)

was set this year, insufficient treatment capacity still resulted in the release of untreated water from the site. Approximately 65 million gallons of untreated water were released into Wightman Fork.

### Site Performance

Collecting, storing and treating contaminated water are major goals of water management at Summitville.

A sampling point known as WF5.5 is used to measure overall site performance with respect to the remedial action levels found in the Site-Wide Record of Decision. This “point of compliance” is located downstream of the Summitville site boundary in Wightman Fork (see Figure 2).

While there has been a significant reduction in copper released from the site over the last decade, figure 3 shows that the site continues to exceed the seasonal remedial action levels for copper at WF5.5. This is due in large part to the inability to collect and store all contaminated water generated by the site.

As per the remedial levels at WF5.5, copper concentrations should be less than 1.55mg/l during spring runoff and less than 0.4mg/l or 0.035mg/l after spring runoff and when the pH is above or below 6 standard units respectively. Seasonally, copper concentrations at WF5.5 meet remedial action goals during heavy spring runoff, but fail for the remainder of the year.

Further downstream in the Alamosa River, with the exception of Segment 3b, the standards for copper have generally been met in recent years.

Efforts at the site are oriented toward continuing improvement to water quality in the Alamosa River.

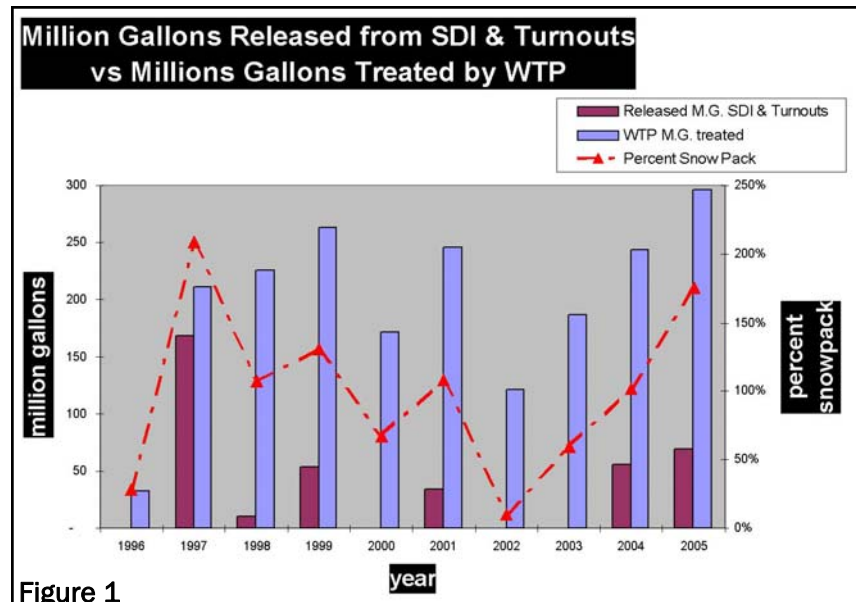


Figure 1

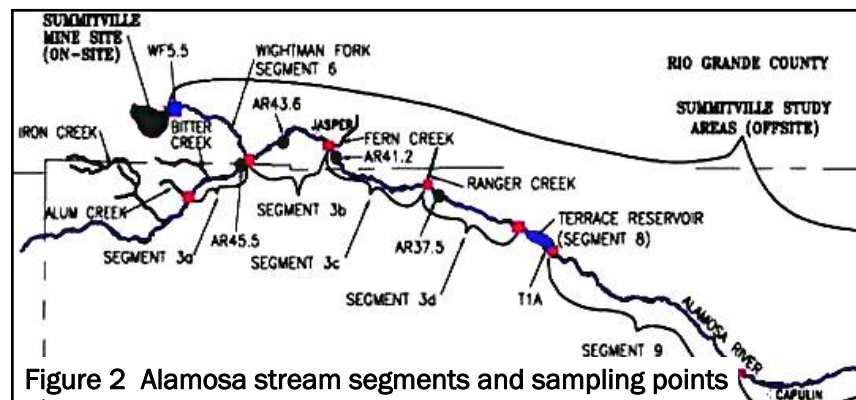


Figure 2 Alamosa stream segments and sampling points

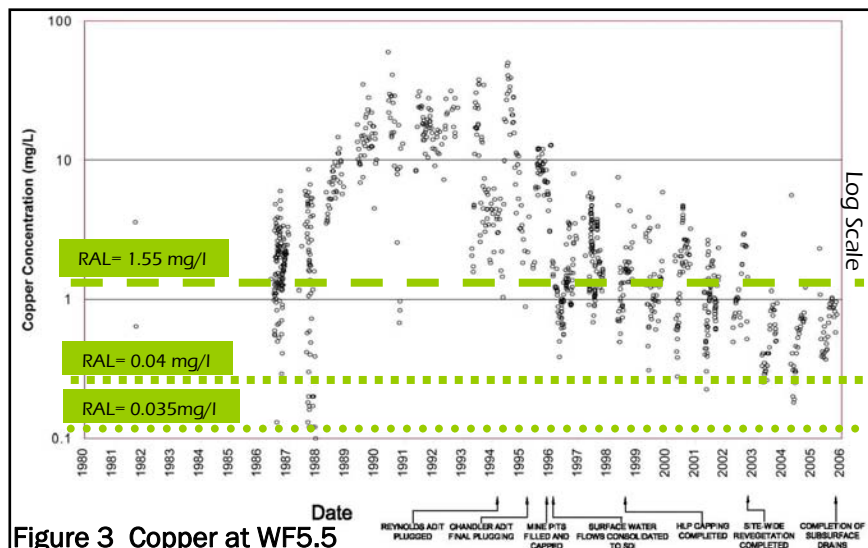


Figure 3 Copper at WF5.5

## STATE AND EPA MANAGERS ADDRESS THE EPA REMEDY REVIEW BOARD

*By Jim Hanley*

In November 2003, the Environmental Protection Agency (EPA) commissioned an internal review committee to evaluate the Superfund program.

Based on the committee's report, the EPA established the National Remedy Review Board (NRRB) consisting of headquarters and regional staff. This board evaluates very costly clean-up plans to make sure that the best technical and most cost effective clean-up approach was selected.

The NRRB reviewed the Summitville Mine Site. This review did not change EPA's current delegation of responsibility for site cleanup decisions to the Regional Office or alter the public's role in site decisions.

The EPA and the State met with the National Remedy Review Board in July 2005. After the meeting, the Review Board made several comments and the State and EPA Region 8 prepared a written response.

The NRRB asked why the State and the EPA were cleaning up the aluminum, which comes mainly from non-site sources. The EPA generally does not establish clean-up goals in a river that are below levels that occur naturally.

At Summitville, the State proposed discharge criteria for the water treatment plant well below natural background levels in order to meet water quality standards in the Alamosa River. To meet this standard, it would be necessary to construct a two-stage water treatment plant. The NRRB believed this plant would cost \$7 million more than a single-stage plant.

The State and EPA, in consultation with the public, responded to the NRRB comments. First, that the additional capital cost of the two-stage plant is not seven million dollars, but rather between \$1.7 and \$3.0 million. The cost differential depends on whether or not the building housing the treatment plant is initially constructed large enough for the two-stage plant or built for the smaller one-stage plant and expanded later.

Where man-made levels exceed acceptable human health or ecological risk-based levels, and the EPA has determined that a response action is appropriate, EPA's goal is to develop a comprehensive response to address watershed-

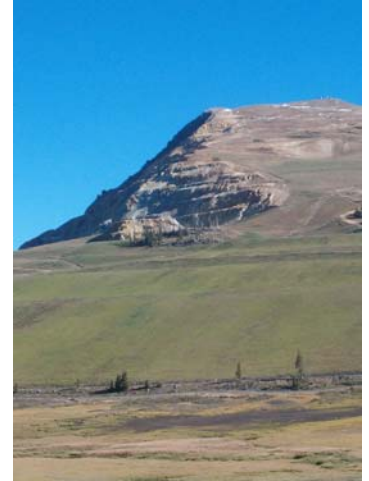
wide contamination. This helps avoid response actions that create "clean tributaries" amid widespread watershed contamination from natural sources.

At Summitville, determining the pre-mining baseline condition was difficult, because mineralized areas vary considerably. It was hard to determine whether or not any particular area was undisturbed by mining and representative of pre-mining surface conditions. The unique nature of each mineral deposit also limits our ability to rely on undisturbed mineralized areas in other parts of the Rio Grande National Forest to be representative of the pre-mining conditions at Summitville.

Natural background concentrations of metals in the upper Alamosa River watershed are often elevated above risk-based values or State and Federal water-quality criteria and standards. Risk-based values are those concentrations at, or above, which an unacceptable human health or ecological effect may occur. Regulatory levels including any applicable or relevant and appropriate requirements, also known as ARARs, may or may not be risk-based values.

Whenever naturally occurring background concentrations exceed risk-based or regulatory values, the Summitville project managers separate risks from site contributions and those present at natural background levels. This enables the government team to gain perspective and make better clean-up decisions.

The EPA's clean-up decisions are based upon both risk assessment and ARARs. The EPA has selected a water treatment requirement with very stringent discharge limits for any new water treatment plant that is built at Summitville in the future in order to meet both risk based and regulatory standards.



South Mountain, the High Wall and the North Waste Dump in the foreground, viewed from the northwest.

**Summitville was one of two sites selected nationally for review into ways to incorporate new technologies and cost-effective clean-up approaches.**



The NRRB review suggests building a new single-stage water treatment plant instead of a dual-stage plant.

## Need More Information?

Visit our website:

<http://www.cdphe.state.co.us/hm/summitville.asp>

Please feel free to contact:

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## Information Repositories

U.S. Department of Agriculture  
Conejos County Natural Resources  
Conservation Service Center  
15 Spruce  
La Jara, CO 81140

Del Norte Public Library  
790 Grand Ave.  
Del Norte, CO 81132

Records Center  
Colorado Department of Public Health & Environment  
Hazardous Materials & Waste Management Division  
4300 Cherry Creek Drive South, Room B-215  
Denver, CO 80246-1530

Superfund Records Center  
U.S. Environmental Protection Agency, Region 8  
999 18th St., Suite 300  
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